

CLAIMS

The following is claimed:

1. A diode-pumped solid state laser amplifier, comprising:

a laser rod; and

5 at least one diode array located proximate to the laser rod, each diode array having a plurality of high-power diode bars spaced thereon wherein the spacing of the high-power diode bars and the location of the diode array from the laser rod are selected to allow the laser rod to receive the radiation emitted by the diode bars in a substantially uniform distribution along the length of the laser rod.

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2. A laser amplifier as recited in Claim 1, wherein each of the high-power diode bars produces at least about 50W.

15 3. A laser amplifier as recited in Claim 1, wherein each diode array includes five high-power diode bars.

4. A laser amplifier as recited in Claim 3, wherein the plurality of high-power diode bars have a spacing of about 12.5 mm in the diode array.

20 5. A laser amplifier as recited in Claim 4, wherein the distance from each diode array to the center of the laser rod is about 25 mm.

6. A laser amplifier as recited in claim 1, wherein five diode arrays are placed around the circumference of the laser rod with an angular separation of about 72 degrees.

5 7. A laser amplifier as recited in claim 1, further comprising a transparent coolant barrier surrounding the laser rod, wherein the coolant barrier is operable to pass a coolant over the surface of the laser rod.

8. A laser amplifier as recited in claim 7, wherein the coolant comprises water.

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9. A diode-pumped solid state laser amplifier comprising:

a first laser rod having a longitudinal axis;

an odd number of first diode arrays located proximate to the first laser rod, each first diode array having a plurality of high-power diode bars spaced thereon wherein the spacing of the high-power diode bars and the location of the first diode array from the first laser rod are selected to allow the first laser rod to receive radiation emitted by the diode bars in a substantially uniform distribution along the length of the first laser rod, wherein the first diode arrays are positioned around the circumference of the laser rod with an even angular separation;

20 a second laser rod having a longitudinal axis that is aligned with the longitudinal of the first laser rod;

an odd number of second diode arrays located proximate to the second laser rod, each second diode array having a plurality of high-power diode bars spaced thereon wherein the spacing of the high-power diode bars and the location of the second diode array from the second laser rod are selected to allow the second laser rod to receive radiation emitted by the diode bars

5 in a substantially uniform distribution along the length of the second laser rod, wherein the second diode arrays are positioned around the circumference of the laser rod with an even angular separation that is inversely proportional to the angular separation of the first diode arrays;

a 90 degree rotator disposed between the first and second laser rods along the
10 longitudinal axes of the laser rods; and
a compensating lens disposed between the first and second laser rods along the
longitudinal axes of the laser rods, wherein the compensating lens imparts a negative spherical
lensing effect.

15 10. A laser amplifier as recited in Claim 9, wherein each of the high-power diode bars produces at least about 50W.

11. A laser amplifier as recited in Claim 9, wherein each of the first and second diode arrays includes five high-power diode bars.

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12. A laser amplifier as recited in Claim 11, wherein the plurality of high-power diode bars have a spacing of about 12.5 mm in the respective diode array.

13. A laser amplifier as recited in Claim 12, wherein the distance from each diode array to the center of the respective laser rod is about 25 mm.

5 14. A laser amplifier as recited in claim 9, wherein five diode arrays are placed around the circumference of the first laser rod with an angular separation of about 72 degrees and five diode arrays are placed around the circumference of the second laser rod with an angular separation of about 72 degrees.

10 15. A laser amplifier as recited in claim 9, further comprising a transparent coolant barrier surrounding the laser rod, wherein the coolant barrier is operable to pass a coolant over the surface of the laser rod.

16. A laser amplifier as recited in claim 9, wherein the coolant comprises water.

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17. A method of manufacturing a diode-pumped solid state laser amplifier, comprising:
providing a laser rod; and
locating at least one diode array proximate to the laser rod, each diode array including a
20 plurality of high-power diode bars, wherein spacing of the high-power diode bars and the

location of the diode array from the laser rod allows the laser rod to receive radiation from the diode arrays in a substantially uniform distribution along the length of the laser rod.